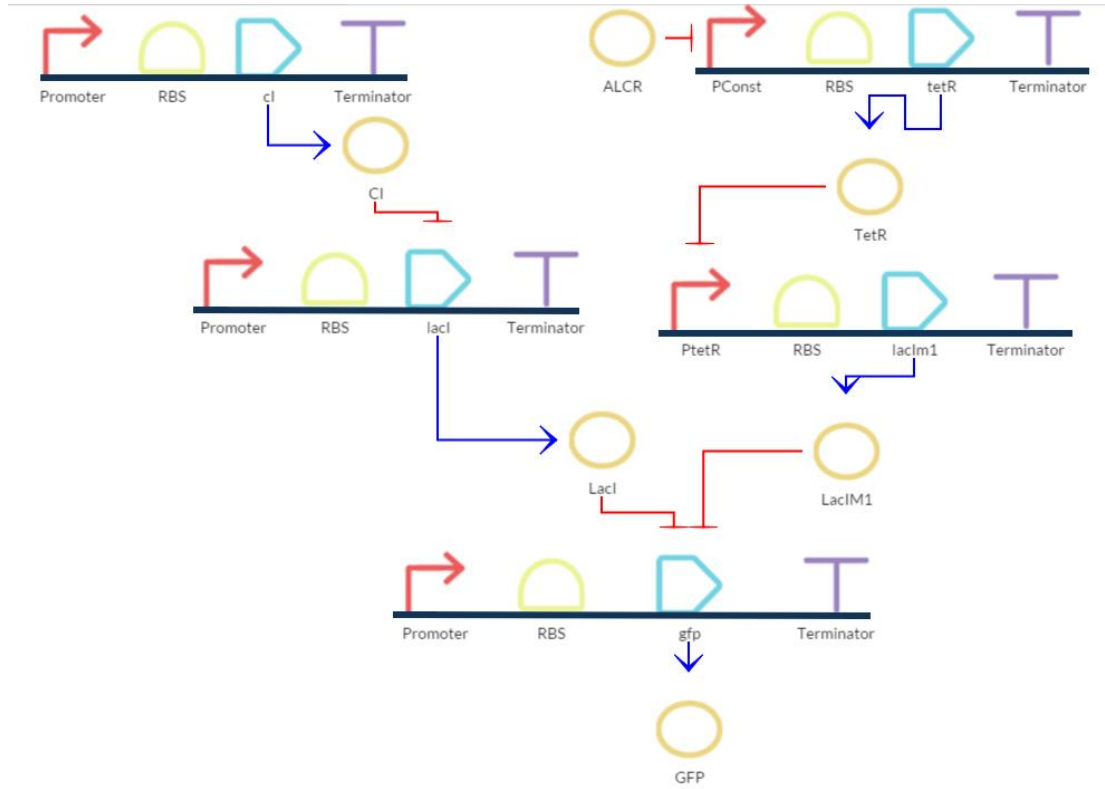


Band_Pass Filter



Formulae for two certain parts

TetR and tetR

$$\frac{d[\text{TetR}]}{dt} = \chi_{P_{\text{Const}}} \alpha_{\text{TetR}} [\text{tetR}^F] - \gamma_{\text{TetR}} [\text{TetR}]$$

$$[\text{tetR}^F] = [\text{tetR}] \frac{1}{1 + \left(\frac{[\text{ALCR}]}{\beta_{\text{ALCR}}} \right)^{n_{\text{ALCR}}}}$$

LacIm1 and lacIm1

$$\frac{d[\text{LacIm1}]}{dt} = \chi_{P_{\text{tetR}}} \alpha_{\text{LacIm1}} [\text{lacIm1}^F] - \gamma_{\text{LacIm1}} [\text{LacIm1}]$$

$$[\text{lacIm1}^F] = [\text{lacIm1}] \frac{1}{1 + \left(\frac{[\text{TetR}]}{\beta_{\text{TetR}}} \right)^{n_{\text{TetR}}}}$$

GFP and gfp

$$\frac{d[\text{GFP}]}{dt} = \chi_{P_{\text{tetR}}} \alpha_{\text{GFP}} [\text{gfp}^F] - \gamma_{\text{GFP}} [\text{GFP}]$$

Assume

$$k_1 = \frac{1}{1 + \left(\frac{[\text{LacI}]}{\beta_{\text{LacI}}} \right)^{n_{\text{LacI}}}}$$

$$k_2 = \frac{1}{1 + \left(\frac{[\text{LacIm1}]}{\beta_{\text{LacIm1}}} \right)^{n_{\text{LacIm1}}}}$$

$$[\text{gfp}^F] = k_1 k_2 [\text{gfp}]$$

CI and cI

$$\frac{d[\text{CI}]}{dt} = \chi_{\text{Pcl}} \alpha_{\text{CI}} [\text{cI}^F] - \gamma_{\text{CI}} [\text{CI}]$$

$$[\text{cI}^F] = [\text{cI}] \frac{1}{1 + \left(\frac{[\text{TetR}]}{\beta_{\text{TetR}}} \right)^{n_{\text{TetR}}}}$$

LacI and lacI

$$\frac{d[\text{LacI}]}{dt} = \chi_{\text{Pcl}} \alpha_{\text{LacI}} [\text{lacI}^F] - \gamma_{\text{LacI}} [\text{LacI}]$$

$$[\text{LacI}^F] = [\text{LacI}] \frac{1}{1 + \left(\frac{[\text{CI}]}{\beta_{\text{CI}}} \right)^{n_{\text{CI}}}}$$

Parameter Table

Symbols	Parameters	Values and Units
Kd	Repression coefficient	4.87
Alpha_AICR	Production rate of AICR	4.32umol*min ⁻¹
Alpha_TetR	Production rate of TetR	3.55umol*min ⁻¹
Alpha_LacIm1	Production rate of LacIm1	5.23 umol*min ⁻¹
Alpha_GFP	Production rate of GFP	6.46 umol*min ⁻¹
Alpha_CI	Production rate of CI	4.37 umol*min ⁻¹
Alpha_LacI	Production rate of LacI	2.67 umol*min ⁻¹
Alpha_LuxI	Production rate of LuxI	4.82 umol*min ⁻¹
Alpha_LuxR	Production rate of LuxR	3.63 umol*min ⁻¹
Alpha_RFP	Production rate of RFP	4.27 umol*min ⁻¹
Gamma_TetR	Degradation rate of TetR	1.52 s ⁻¹
Gamma_LacIm1	Degradation rate of LacIm1	0.92s ⁻¹
Gamma_GFP	Degradation rate of GFP	1.14 s ⁻¹
Gamma_CI	Degradation rate of CI	0.83s ⁻¹
Gamma_LacI	Degradation rate of LacI	1.34s ⁻¹
Gamma_LuxI	Degradation rate of LuxI	1.62s ⁻¹

Gamma_LuxR	Degradation rate of LuxR	$0.62s^{-1}$
Gamma_RFP	Degradation rate of RFP	$1.25s^{-1}$
Beta_ALCR	ALCR Repression coefficient	4
Beta_TetR	TetR Repression coefficient	3
Beta_LacI	LacI Repression coefficient	3
Beta_LacIm1	LacIm1 Repression coefficient	4
Beta_CI	CI Repression coefficient	3
n_ALCR	ALCR Cooperativity coefficient	2
n_TetR	TetR Cooperativity coefficient	1
n_LacI	LacI Cooperativity coefficient	2
n_LacIm1	LacIm1 Cooperativity coefficient	2
n_CI	CI Cooperativity coefficient	1
n	Hill coefficient	3
d	Protein degradation rate	$1.14 s^{-1}$

Reference: http://2011.igem.org/Team:ETH_Zurich